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(54) COMPOSITIONS FOR ORAL CAVITY

(57) The present invention provides an oral composition comprising microcrystalline cellulose, and one or more surface active agents selected from the group consisting of alkyl glucoside, polyglycerin fatty acid ester, sucrose fatty acid ester and betaine, which has an excellent shape-holding ability and dispersibility in an oral cavity, does not change a taste of juice after teeth brushing, in addition, has excellent stability with time not causing solid-liquid separation. Moreover, the present invention provides an oral composition comprising a cationic antimicrobial agent and microcrystalline cellulose, which can effectively prevent an oral cavity disease such as a periodontal disease, dental caries and the like by enhancing an ability of the cationic antimicrobial agent to reside on a tooth surface.

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Description

Background of the Invention

Field of the Invention

[0001] The present invention relates to an oral composition which has an excellent shape-holding ability and dispersibility, and does not change a taste of juice after teeth brushing and, particularly, has excellent stability with time. Moreover, the present invention relates to an oral composition having an excellent ability of a cationic antimicrobial agent to reside on a tooth surface.

Description of the Related Art

[0002] Hitherto, a shape-holding ability and dispersibility in an oral cavity of an oral composition have been obtained by containing therein a thickening agent, which is generally and frequently used, such as carboxymethyl cellulose, methyl cellulose, hydroxyethyl cellulose, gum arabic, xanthan gum, carrageenan, sodium alginate, sodium polyacrylate and the like. In addition, an oral composition having better shape-holding ability and dispersibility in an oral cavity than those of prior art, which is prepared by containing therein finely-divided cellulose, has been proposed in JPA 58861/1993. However, such the oral composition has practical problems such as occurrence of solid-liquid separation during long term storage. In addition, in such the oral composition, sodium alkylsulfate is used as a surface active agent, which is known to change a taste of juice after teeth brushing.

[0003] On the other hand, a cationic antimicrobial agent is contained in various oral compositions in order to prevent an oral cavity disease such as a periodontal disease, dental caries and the like, because it has an excellent ability to be adsorbed to an oral tissue, an enhanced antimicrobial activity and an enhanced plaque formation-suppressing effect.

[0004] However, there was a problem that, since the cationic antimicrobial agent has an electric charge, it forms an electrostatic complex with other anionic ingredients contained in the oral composition, and an antimicrobial activity per unit of the cationic antimicrobial agent is reduced. In response thereto, attempts have been conducted to prevent reduction of the activity per unit of the cationic antimicrobial agent, by containing a nonionic or amphoteric surface active agent or a nonionic thickening agent in the oral compositions, but sufficient effects have not been obtained yet.

[0005] On the other hand, even the cationic antimicrobial agent exhibits a transient antimicrobial effect in many cases, and it is contemplated that an activity of the cationic antimicrobial agent can be totally enhanced by improving an ability of the cationic antimicrobial agent to reside on a tooth surface.

Brief Summary of the Invention

[0006] A first object of the present invention is to provide an oral composition which retains better shape-holding ability, is excellent in dispersibility in an oral cavity, does not change a taste of juice after teeth brushing, and does not cause solid-liquid separation during long term storage and, additionally, which has an improved ability of the cationic antimicrobial agent to reside on a tooth surface.

[0007] Moreover, a second object of the present invention is to provide an oral composition which can effectively prevent a periodontal disease and dental caries by enhancing the ability of a cationic antimicrobial agent to reside on a tooth surface to enhance a residence antimicrobial activity of the cationic antimicrobial agent.

[0008] In view of above former situations, the present inventors studied intensively, and found that an oral composition which has an excellent shape-holding ability and dispersibility in an oral cavity, does not change a taste of juice after teeth brushing, and does not cause solid-liquid separation during long term storage, can be obtained by containing a combination of microcrystalline cellulose and a particular surface active agent, which resulted in completion of a first aspect of the present invention.

[0009] Moreover, in view of above latter situations, the present inventors studied intensively, and found that the ability of the cationic antimicrobial agent to reside on a tooth surface is significantly enhanced by containing a specific combination of the cationic antimicrobial agent and microcrystalline cellulose, which resulted in completion of a second aspect of the present invention.

[0010] That is, in accordance with the first aspect, the present invention provides:

1. An oral composition comprising microcrystalline cellulose, and one or more surface active agents selected from the group consisting of alkyl glucoside, polyglycerin fatty acid ester, sucrose fatty acid ester and betaine;
2. The oral composition of according to (1), wherein the microcrystalline cellulose is contained at 0.2-10 % by weight;
3. The oral composition according to (1) or (2), wherein the surface active agent is alkyl glucoside;

4. The oral composition according to (3), wherein an alkyl chain of the alkyl glucoside is C8-C16 in length;
5. The oral composition according to (1) or (2), wherein the surface active agent is polyglycerin fatty acid ester or sucrose fatty acid ester;
6. The oral composition according to (5), wherein an alkyl chain of a fatty acid portion of the polyglycerin fatty acid ester or the sucrose fatty acid ester is C8-C16 in length;
7. The oral composition according to (1) or (2), wherein the surface active agent is betaine;
8. The oral composition according to (7), wherein the betaine is fatty acid amide propyl betaine;
9. The oral composition according to (8), wherein an alkyl chain of a fatty acid portion of the fatty acid amide propyl betaine is C8-C16 in length; and
10. The oral composition according to any one of (1)-(9), further comprising a cationic antimicrobial agent.

[0011] According to the first aspect of the present invention, an oral composition can be provided, which has an excellent shape-holding ability and dispersibility in an oral cavity, does not change a taste of juice after teeth brushing and, particularly, has excellent stability with time, or additionally has an enhanced ability of the cationic antimicrobial agent to reside on a tooth surface in addition to above characteristics.

[0012] Moreover, in accordance with the second aspect, the present invention provides:

11. An oral composition comprising a cationic antimicrobial agent and microcrystalline cellulose;
12. The oral composition according to (11), wherein the cationic antimicrobial agent is a quaternary ammonium salt;
13. The oral composition according to (11), wherein the cationic antimicrobial agent is a biguanide antimicrobial agent;
14. The oral composition according to (11), wherein the cationic antimicrobial agent is one or more selected from the group consisting of cetylpyridinium chloride, benzalkonium chloride, benzethonium chloride, chlorhexidine hydrochloride and chlorhexidine gluconate;
15. The oral composition according to any one of (11)-(14), wherein the cationic antimicrobial agent is contained at 0.001-10 % by weight;
16. The oral composition according to any one of (11)-(15), wherein the microcrystalline cellulose is contained at 0.2-10 % by weight;
17. The oral composition according to any one of (11)-(16), further comprising one or more surface active agents selected from nonionic and amphoteric surface active agents;
18. The oral composition according to (17), wherein the surface active agent is alkyl glucoside having an alkyl chain of C8-C16 in length; and
19. The oral composition according to (17), wherein the surface active agent is fatty acid amide propyl betaine having an alkyl chain of a fatty acid portion of C8-C16 in length.

[0013] According to the second aspect of the present invention, an oral composition can be provided, which can significantly enhance the effect of the cationic antimicrobial agent to reside on the tooth surface and effectively prevent the oral cavity disease such as the periodontal disease, dental caries and the like.

Detailed Description of the Invention

[0014] The first and second aspects of the present invention are sequentially illustrated below.

[0015] Microcrystalline cellulose used in the first aspect of the present invention is not particularly limited as far as it is commercially available, but microcrystalline cellulose having an average particle diameter of 10 micrometer or smaller is more preferable and microcrystalline cellulose having an average particle diameter of 2-6 micrometer is most preferable. When the average particle diameter of microcrystalline cellulose is larger than 10 micrometer, dispersibility of the oral composition in the oral cavity is deteriorated. In addition, an amount of microcrystalline cellulose to be contained is preferably 0.2-10 % by weight based on a total weight of the oral composition. When the amount of microcrystalline cellulose is smaller than 0.2 % by weight, an adequate shape-holding ability of the oral composition can not be achieved, being is not preferable. On the other hand, when the amount of microcrystalline cellulose is larger than 10 % by weight, a viscosity of the oral composition becomes too high, being not preferable.

[0016] The surface active agent used in the first aspect of the present invention includes alkyl glucoside, polyglycerin fatty acid ester, sucrose fatty acid ester and betaine, and they may be used alone or in a combination of two or more. An amount of the surface active agent to be contained is preferably 0.5-5 % by weight based on a total weight of the oral composition. When the amount of the surface active agent to be contained is smaller than 0.5 % by weight, a foaming ability of the oral composition is reduced, and a use feeling is deteriorated, being not preferable. On the other hand, when the amount of the surface active agent to be contained is larger than 5 % by weight, a taste or a smell derived from the surface active agent becomes unnegligible, being not preferable.

[0017] Among above surface active agents, alkyl glucoside used in the present invention is not particularly limited, but an alkyl chain thereof is preferably C8-C16 in length. When the alkyl chain is shorter than C8, a bitter taste is produced in the oral composition, being not preferable. On the other hand, when the alkyl chain is longer than C16, the foaming ability of the oral composition is lowered and it becomes uncomfortable to use in some cases, being not preferable. Examples within such the chain length range include decyl glucoside, lauryl glucoside, myristyl glucoside and the like, and PLANTACARE 1200, PLANTACARE 2000 (Cognis), Oramix NS10, Oramix NS26 (SEPPIC) and the like are commercially available.

[0018] In addition, polyglycerin fatty acid ester used in the first aspect of the present invention is not particularly limited, but an alkyl chain of a fatty acid portion thereof is preferably C8-C16 in length. When the alkyl chain is shorter than C8, a bitter taste is produced in the oral composition. On the other hand, when the alkyl chain is longer than C16, there is a tendency that the foaming ability of the oral composition is lowered. In addition, a polymerization degree of a polyglycerin portion is preferably equal to or greater than 4. When the polymerization degree is equal to or smaller than 3, there is a tendency that the foaming ability of the oral composition is lowered. Examples of such polyglycerin fatty acid ester include decaglycerin monolauric acid ester, tetraglycerin monolauric acid ester, decaglycerin monomyristic acid ester, tetraglycerin monomyristic acid ester and the like, and NIKKOL Decaglyn 1-L, NIKKOL Tetraglyn 1-L, NIKKOL Decaglyn 1-M (Nikko Chemicals, Co., Ltd.), Sunsoft Q-12W, Sunsoft Q-12T, Sunsoft Q-14W (Taiyo Kagaku Co., Ltd.) and the like are commercially available.

[0019] In addition, sucrose fatty acid ester used in the first aspect of the present invention is not particularly limited, but an alkyl chain of a fatty acid portion thereof is preferably C8-C16 in length. When the alkyl chain is shorter than C8, a bitter taste is produced in the oral composition. On the other hand, when the alkyl chain is longer than C16, the foaming ability of the oral composition is lowered and an oily taste is produced in some cases in the oral composition. Examples of such sucrose fatty acid ester include sucrose lauric acid ester, sucrose palmitic acid ester and the like, and DK ester S series (Daiichi Kogyo Seiyaku Co., Ltd.), Ryoto sugar ester (Mitsubishi Kagaku Foods Co.) and the like are commercially available.

[0020] In addition, the betaine surface active agent used in the first aspect of the present invention is not particularly limited, but examples thereof include alkyl betaine, fatty acid amide propyl betaine, alkyl sulfobetaine, imidazolinium betaine and the like. Among them, fatty acid amide propyl betaine is preferable in view of its weak bitter taste. In addition, an alkyl chain of a fatty acid portion of fatty acid amide propyl betaine is preferably C8-C16 in length. When the alkyl chain is shorter than C8, a bitter taste is produced in the oral composition. On the other hand, when the alkyl chain is longer than C16, the foaming ability of the oral composition is lowered and an oily taste is produced in some cases in the oral composition. Examples of fatty acid amide propyl betaine having such the chain length range include cocamidopropyl betaine, lauric acid amide propyl betaine, myristic acid amide propyl betaine and the like, and there are commercially available products such as SWANOL (Nikko Chemicals, Co., Ltd.), Obazolin (Toho Chemical Industry Co., Ltd.), RIKABION (New Japan Chemical Co., Ltd.), Tego-Betaine (Goldschmidt AG), Empigen (Albright & Wilson) and the like.

[0021] In addition, a cationic antimicrobial agent used in the first aspect of the present invention is not particularly limited, but a quaternary ammonium salt and a biguanide antimicrobial agent are preferable, and examples thereof include, for example, the quaternary ammonium salt such as cetylpyridinium chloride, benzalkonium chloride, benzethonium chloride, distearyldimethyl ammonium chloride, stearyldimethylbenzyl ammonium chloride, stearyltrimethyl ammonium chloride, cetyltrimethyl ammonium chloride, lauryltrimethyl ammonium chloride, laurylpyridinium chloride and the like, and the biguanide antimicrobial agent such as chlorhexidine hydrochloride, chlorhexidine acetate, chlorhexidine gluconate, alexidin hydrochloride, alexidin acetate, alexidin gluconate and the like, and the like. Among them, cetylpyridinium chloride and benzalkonium chloride are more preferable, and cetylpyridinium chloride is particularly preferable. These cationic bacrtericides may be contained alone or in a combination of two or more. In addition, an mount of the cationic antimicrobial agent to be contained is preferably 0.001-10 % by weight, and more preferably 0.01-1 % by weight based on a total weight of the oral composition. When the amount of the cationic antimicrobial agent is smaller than 0.001 % by weight, an antimicrobial effect of the oral composition can not be expected. On the other hand, when the amount of the cationic antimicrobial agent is larger than 10 % by weight, an irritation to an oral mucous membrane becomes strong, being not preferable in view of safety.

[0022] The oral composition of the first aspect of the present invention can be prepared in a form of toothpaste, wet dentifrices, liquid dentifrices, oral paste, gels, sprays, foams and the like. Ingredients, for example, active ingredients, foaming agents or detergents, polishing agents, thickening agents, humectants, preservatives, flavors, sweeteners, pH adjusting agents or the like may be properly contained in the oral composition of the first aspect of the present invention as far as they do not deteriorate the effects of the present invention, depending on a difference in the form of the oral composition.

[0023] Among them, examples of the active ingredient include a nonionic antimicrobial agent such as triclosan, isopropyl methylphenol and the like, a fluoride such as sodium fluoride, potassium fluoride, ammonium fluoride, stannous fluoride, sodium monofluorophosphate and the like, an enzyme such as amylase, protease, lysozyme, dextranase and

the like, a vitamin such as vitamins B, C and E and the like, a potassium salt and the like.

[0024] Examples of the foaming agent or detergent include an anionic surface active agent such as sodium N-acyl sarcosinate, N-acyl glutamate, sodium N-methyl-N-acyltaurine, sodium N-methyl-N-acylalanine, sodium alpha-olefin sulfonate and the like; a nonionic surface active agent such as polyoxyethylene fatty acid ester such as polyoxyethylene sorbitan fatty acid ester such as polyoxyethylene sorbitan monolaurate, or polyoxyethylene hydrogenated castor oil, lauric acid monoethanol amide, myristic acid monoethanol amide, polyoxyethylene higher alcohol-ether, polyoxyethylene (polyoxypropylene) copolymer, polyoxyethylene (polyoxypropylene) fatty acid ester and the like; an amphoteric surface active agent such as N-alkyldiamino ethyl glycine and the like, in addition to the surface active agents as described above. But, when the oral composition of the first aspect of the present invention contains the cationic antimicrobial agent, it is not preferable that it contains the anionic surface active agent.

[0025] Examples of the polishing agent include calcium hydrogenphosphate dihydrate or anhydrate, calcium phosphate, calcium tertiary phosphate, magnesium tertiary phosphate, calcium pyrophosphate, hydroxyapatite, insoluble sodium metaphosphate, silicic acid hydrate, silicic acid anhydrate, silica gel, precipitated silica, aluminum silicate, zirconium silicate, calcium silicate, calcium carbonate, magnesium carbonate, alumina, aluminum hydroxide, calcium sulfate, methyl polymethacrylate and the like.

[0026] Examples of the thickening agent include an anionic thickening agent such as sodium carboxymethyl cellulose, sodium carboxymethyl hydroxyethyl cellulose and the like, a cellulose derivative such as hydroxyethyl cellulose, hydroxypropyl cellulose and the like, natural gum such as xanthan gum, tragacanth, gum karaya, gum arabic, carrageenan and the like, a cationic thickening agent such as O-[2-hydroxy-3-(trimethylammonio) propyl]hydroxyethyl cellulose chloride and the like, in addition to microcrystalline cellulose used in the present invention. But, when the oral composition of the first aspect of the present invention contains the cationic antimicrobial agent, it is not preferable that it contains the anionic thickening agent.

[0027] Examples of the humectant include glycerin, propylene glycol, 1,3-butylene glycol, sorbitol, polyethylene glycol, xylitol, polypropylene glycol and the like.

[0028] Examples of the preservative include paraoxybenzoic acid ester such as methyl paraben, propyl paraben and the like, benzoate, sodium benzoate and the like.

[0029] Examples of the flavor include menthol, carvone, eugenol, methyl salicylate, methyl eugenol, thymol, anethole, limonene, ocimene, n-decyl alcohol, citronel, alpha-terpineol, methyl acetate, citronenyl acetate, cinneole, linalool, ethyl linalool, vanillin, thyme, nutmeg, spearmint oil, peppermint oil, lemon oil, orange oil, sage oil, rosemary oil, cinnamon oil, perilla oil, wintergreen oil, cloves oil, eucalyptus oil, piment oil, tea tree oil, Davana oil and the like.

[0030] Examples of the sweetener include saccharin sodium, acesulfame potassium, stevioside, neohesperidin dihydrochalcone, glycyrrhizin, perillartine, thaumatin, aspartyl phenylalanine methyl ester, methoxycinnamic aldehyde, xylit and the like.

[0031] Examples of the pH-adjusting agent include citric acid, phosphoric acid, malic acid, gluconic acid, maleic acid, aspartic acid, gluconic acid, succinic acid, glucuronic acid, fumaric acid, glutamic acid, adipic acid and salts thereof, hydrochloric acid, sodium hydroxide, potassium hydroxide, sodium silicate and the like.

[0032] These ingredients may be contained alone or in a combination of two or more in the oral composition of the first aspect of the present invention.

[0033] Next, the cationic antimicrobial agent used in the second aspect of the present invention is not particularly limited, but a quaternary ammonium salt and a biguanide antimicrobial agent are preferable, and examples thereof include, for example, the quaternary ammonium salt such as cetylpyridinium chloride, benzalkonium chloride, benzethonium chloride, distearyldimethyl ammonium chloride, stearyldimethylbenzyl ammonium chloride, stearyltrimethyl ammonium chloride, cetyltrimethyl ammonium chloride, lauryltrimethyl ammonium chloride, laurylpyridinium chloride and the like, and the biguanide antimicrobial agent such as chlorhexidine hydrochloride, chlorhexidine acetate, chlorhexidine gluconate, alexidin hydrochloride, alexidin acetate, alexidin gluconate and the like, and the like. These cationic antimicrobial agents may be contained alone or in a combination of two or more. In addition, an amount of the cationic antimicrobial agent to be contained is preferably 0.001-10 % by weight and more preferably 0.01-1 % by weight based on a total weight of the oral composition. When the amount of the cationic antimicrobial agent is smaller than 0.001 % by weight, an expected antimicrobial effect is not exerted. On the other hand, when the amount of the cationic antimicrobial agent is larger than 10 % by weight, an irritation to an oral mucous membrane becomes strong, being not preferable in view of safety.

[0034] In addition, microcrystalline cellulose used in the second aspect of the present invention is not particularly limited as far as it is commercially available. An amount of microcrystalline cellulose to be contained is preferably 0.2-10 % by weight and more preferably 0.5-5 % by weight based on a total weight of the oral composition. When the amount of microcrystalline cellulose is smaller than 0.2 % by weight, an effect for enhancing residence of the antimicrobial agent on a tooth surface is lowered. On the other hand, when the amount of microcrystalline cellulose is larger than 10 % by weight, a viscosity of the oral composition becomes too high, being not preferable. In addition, an average particle diameter of microcrystalline cellulose is preferably equal to or smaller than 10 micrometer and more preferably

2-6 micrometer, in view of homogeneous dispersion in the oral composition. In addition, as a matter of fact, microcrystalline cellulose having an average particle diameter smaller than 0.1 micrometer is hard to obtain.

[0035] In addition, the surface active agent used in the second aspect of the present invention is preferably a nonionic surface active agent, an amphoteric surface active agent or a cationic surface active agent. When the anionic surface active agent is used in the oral composition of the present invention, stability of the cationic antimicrobial agent in a formulation may be deteriorated. More preferably, the surface active agent is the nonionic and amphoteric surface active agents. Examples of the nonionic surface active agent include, for example, sugar fatty acid ester such as alkyl glucoside, sucrose fatty acid ester, maltose fatty acid ester, lactose fatty acid ester and the like, polyoxyethylene alkyl ether, fatty acid alkanol amide, polyoxyethylene sorbitan fatty acid ester such as polyoxyethylene sorbitan monolaurate, polyoxyethylene sorbitan monostearate and the like, polyoxyethylene hydrogenated castor oil, sorbitan fatty acid ester, polyglycerin fatty acid ester such as decaglycerin monolauric acid ester, pentaglycerin distearic acid ester and the like, polyoxyethylene (polyoxypropylene) copolymer, and the like. Examples of the amphoteric surface active agent include, for example, N-alkyldiamino ethyl glycine such as N-lauryldiamino ethyl glycine, N-myristyl dimino ethyl glycine and the like, fatty acid amide propyl betaine, N-alkyl-N-carboxymethyl ammonium betaine, sodium 2-alkyl-1-hydroxyethyl imidazoline betaine and the like. Among them, alkyl glucoside, sucrose fatty acid ester, polyoxyethylene hydrogenated caster oil, polyglycerin fatty acid ester, polyoxyethylene (polyoxypropylene) copolymer, N-alkyl diamino ethyl glycine and fatty acid amide propyl betaine are preferable. Among them, alkyl glucoside and fatty acid amide propyl betaine are particularly preferable. In addition, an alkyl chain of alkyl glucoside of C8-C16 in length is preferable, and an alkyl chain of alkyl glucoside of C10-C14 in length is particularly preferable. In addition, an alkyl chain of a fatty acid portion of fatty acid amide propyl betaine is preferably C10-C14 in length, and particularly C12-C14 in length. An amount of the surface active agent to be contained is preferably 0.5-5 % by weight based on a total weight of the oral composition.

[0036] The oral composition of the second aspect of the present invention can be prepared in a form of toothpaste, wet dentifrices, liquid dentifrices, oral paste, gels and the like. Ingredients, for example, active ingredients, polishing agents, thickening agents, humectants, preservatives, flavors, sweeteners, pH adjusting agents or the like may be properly contained in the oral composition of the second aspect of the present invention as far as they do not deteriorate the effects of the present invention, depending on a difference in the form of the oral composition.

[0037] Among them, examples of the active ingredient include a nonionic antimicrobial agent such as triclosan, isopropyl methylphenol and the like, a fluoride such as sodium fluoride, potassium fluoride, ammonium fluoride, stannous fluoride, sodium monofluorophosphate and the like, an enzyme such as amylase, protease, lysozyme, dextranase and the like, a vitamin such as vitamins B, C and E and the like, an astringent such as potassium nitrate, aluminum lactate and the like, and the like, in addition to the cationic antimicrobial agent such as the quaternary ammonium salt and the biguanide antimicrobial agent as described above.

[0038] Examples of the polishing agent include calcium hydrogenphosphate, dihydrate and anhydrate, calcium phosphate, calcium tertiary phosphate, magnesium tertiary phosphate, calcium pyrophosphate, hydroxyapatite, insoluble sodium metaphosphate, silicic acid hydrate, silicic acid anhydrate, silica gel, precipitated silica, aluminum silicate, zirconium silicate, calcium silicate, calcium carbonate, magnesium carbonate, alumina, aluminum hydroxide, calcium sulfate, methyl polymethacrylate and the like. Among them, calcium hydrogenphosphate, dihydrate and anhydrate, calcium phosphate, calcium tertiary phosphate, magnesium tertiary phosphate, calcium pyrophosphate, hydroxyapatite, calcium carbonate and magnesium carbonate are preferable.

[0039] Examples of the thickening agent include a cellulose derivative such as hydroxyethyl cellulose, hydroxypropyl cellulose and the like, a natural gum such as carrageenan, xanthan gum, tragacanth, gum karaya, gum arabic, gellan gum and the like, a synthetic thickening agent such as poly (vinylalcohol), sodium polyacrylate and the like, an inorganic thickening agent such as viscosity-increasing silica, veegum and the like, and the like, in addition to microcrystalline cellulose used in the oral composition of the present invention.

[0040] Examples of the humectant include glycerin, ethylene glycol, propylene glycol, 1,3-butylene glycol, polyethylene glycol, polypropylene glycol, sorbit, xylit, maltit, lactit, palatinit and the like.

[0041] Examples of the preservative include paraoxybenzoic acid ester such as methyl paraben, propyl paraben and the like, benzoate, sodium benzoate and the like.

[0042] Examples of the flavor include menthol, carvone, eugenol, methyl salicylate, methyl eugenol, thymol, anethole, limonene, ocimene, n-decyl alcohol, citronel, alpha-terpineol, methyl acetate, citronenyl acetate, cinneole, linalool, ethyl linalool, vanillin, thyme, nutmeg, spearmint oil, peppermint oil, lemon oil, orange oil, sage oil, rosemary oil, cinnamon oil, perilla oil, wintergreen oil, cloves oil, eucalyptus oil, piment oil, tea tree oil, Davana oil and the like.

[0043] Examples of the sweetener include saccharin sodium, acesulfame potassium, stevioside, neohesperidin dihydrochalcone, glycyrrhizin, perillartine, thaumatin, aspartyl phenylalanine methyl ester, methoxycinnamic aldehyde, xylit and the like.

[0044] Examples of the pH-adjusting agent include citric acid, phosphoric acid, malic acid, gluconic acid, maleic acid, aspartic acid, gluconic acid, succinic acid, glucuronic acid, fumaric acid, glutamic acid, adipic acid and salts thereof, hydrochloric acid, sodium hydroxide, potassium hydroxide, sodium silicate and the like.

[0045] These ingredients may be contained alone or in a combination of two or more in the oral composition of the second aspect of the present invention.

Examples

[0046] The first and second aspects of the present invention will be further illustrated in detail by referring to the following Examples, but the present invention is not limited to such the Examples. In the Examples, the term "%" means "% by weight", unless otherwise indicated.

[0047] Each oral composition of the present invention was prepared according to the formulation shown in Table 1 by conventional procedures. Each composition obtained was tested for stability with time at room temperature for one month. The results thereof are shown in Table 1.

Evaluation criteria

[0048] Stability with time after one month storage at room temperature:

O: No solid-liquid separation was observed
X: Solid-liquid separation was observed

[Table 1]

Ingredient (%)	Comparative Example				Example			
	1	2	3	4	1	2	3	4
Microcrystalline cellulose (average particle diameter 4 micrometer	3	3	3	3	3	3	3	3
Hydroxyethyl cellulose	1	3	1	1	1	1	1	1
Xanthan gum	-	-	1	1	-	-	-	-
Poloxamer 238 (Pluronic F88)	3	3	3	-	-	-	-	-
Polyoxyethylene (60 E.O.) hydrogenated castor oil (HCO-60)	-	-	-	3	-	-	-	-
Lauryl glucoside	-	-	-	-	3	-	-	-
Decaglycerin lauric acid ester	-	-	-	-	-	3	-	-
Sucrose lauric acid ester	-	-	-	-	-	-	3	-
Cocamidopropyl betaine	-	-	-	-	-	-	-	1
Dicalcium phosphate	30	30	30	30	30	30	30	30
Flavor	1	1	1	1	1	1	1	1
Saccharin sodium	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Titanium oxide	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Concentrated glycerin	20	20	20	20	20	20	20	20
Purified water	remainder	remainder	remainder	remainder	remainder	remainder	remainder	remainder
Stability with time	X	X	X	X	O	O	O	O

[0049] As shown in Table 1, in Comparative Examples 1-3, the oral compositions containing Pluronic F88 as the surface active agent caused solid-liquid separation even when an amount of hydroxyethyl cellulose was increased, or even when xanthan gum as another thickening agent was contained together. In addition, the oral composition caused solid-liquid separation even when HCO-60 was used as the surface active agent.

[0050] On the other hand, in Examples 1-4, the oral compositions containing lauryl glucoside, polyglycerin lauric acid ester, sucrose lauric acid ester or cocamidopropyl betaine as the surface active agent, did not cause solid-liquid separation even after one month storage at room temperature, which had excellent stability with time.

Example 5

[0051] An oral composition (toothpaste) of the following formulation was prepared according to the conventional procedures:

Ingredient Name	Amount (%)
Microcrystalline cellulose (average particle diameter 3.7 micrometer)	3.0
Decyl glucoside	2.0
Silica	30.0
Sodium carboxymethyl cellulose	2.0
Tocopherol acetate	0.05
Sodium fluoride	0.2
Flavor	1.0
Saccharin sodium	0.1
Titanium oxide	0.3
Sorbit solution	30.0
Purified water	remainder

[0052] The oral composition obtained had an excellent shape-holding ability and dispersibility in an oral cavity, did not change a taste of juice after teeth brushing and had excellent stability with time.

Example 6

[0053] An oral composition (toothpaste) of the following formulation was prepared according to the conventional procedures:

Ingredient Name	Amount (%)
Microcrystalline cellulose (average particle diameter 3.7 micrometer)	3.0
Cocamidopropyl betaine	0.8
Calcium hydrogenphosphate	35.0
Cetylpyridinium chloride	0.1
Hydroxyethyl cellulose	2.0
Tocopherol acetate	0.05
Sodium monofluorophosphate	0.72
Flavor	1.0
Saccharin sodium	0.1
Titanium oxide	0.3
Concentrated glycerin	15.0
Purified water	remainder

[0054] The oral composition obtained had an excellent shape-holding ability and dispersibility in an oral cavity, did not change a taste of juice after teeth brushing and had excellent stability with time. In addition, the oral composition obtained had an enhanced effect of cetylpyridinium chloride to reside on a tooth surface.

Example 7

[0055] An oral composition (toothpaste) of the following formulation was prepared according to the conventional procedures:

Ingredient Name	Amount (%)
Microcrystalline cellulose (average particle diameter 3.7 micrometer)	2.0
Sucrose lauric acid ester	2.0
Calcium pyrophosphate	35.0
Xanthan gum	0.5
Sodium monofluorophosphate	0.72
Flavor	1.0
Saccharin sodium	0.1
Titanium oxide	0.3
Concentrated glycerol	18.0
Polyethylene glycol	5.0
Purified water	remainder

[0056] The oral composition obtained had an excellent shape-holding ability and dispersibility in an oral cavity, did not change a taste of juice after teeth brushing and had excellent stability with time.

Example 8

[0057] An oral composition (toothpaste) of the following formulation was prepared according to the conventional procedures:

Ingredient Name	Amount (%)
Microcrystalline cellulose (average particle diameter 3.7 micrometer)	2.0
Decaglycerin lauric acid ester	2.0
Calcium carbonate	25.0
Sodium carboxymethyl cellulose	1.0
	1.0
Saccharin sodium	0.1
Titanium oxide	0.3
Concentrated glycerin	10.0
Xylitol	10.0
Purified water	remainder

[0058] The oral composition obtained had an excellent shape-holding ability and dispersibility in an oral cavity, did not change a taste of juice after teeth brushing and had excellent stability with time.

Example 9

[0059] An oral composition (gel) of the following formulation was prepared according to the conventional procedures:

Ingredient Name	Amount (%)
Microcrystalline cellulose (average particle diameter 3.7 micrometer)	4.0
Decyl glucoside	1.0
Sodium fluoride	0.2
Concentrated glycerin	40.0
Polyethylene glycol	5.0
Propylene glycol	8.0
Flavor	1.0

(continued)

Ingredient Name	Amount (%)
Saccharin sodium	0.1
Disodium hydrogenphophate	0.12
Sodium dihydrogenphosphate	0.01
Purified water	remainder

[0060] The oral composition obtained had an excellent shape-holding ability and dispersibility in an oral cavity, did not change a taste of juice after teeth brushing and had excellent stability with time.

Example 10

[0061] An oral composition (gel) of the following formulation was prepared according to the conventional procedures:

Ingredient Name	Amount (%)
Microcrystalline cellulose (average particle diameter 3.7 micrometer)	5.0
Myristic acid amide propyl betaine	0.5
Tetraglycerin lauric acid ester	1.0
Tocopherol acetate	0.1
Concentrated glycerin	30.0
Polyethylene glycol	4.0
1,3-Butylene glycol	2.0
Flavor	1.0
Saccharin sodium	0.1
Disodium hydrogencitrate	0.12
Sodium dihydrogencitrate	0.01
Purified water	remainder

[0062] The oral composition obtained had an excellent shape-holding ability and dispersibility in an oral cavity, did not change a taste of juice after teeth brushing and had excellent stability with time.

Example 11

[0063] An oral composition (toothpaste) of the following formulation was prepared according to the conventional procedures:

Ingredient Name	Amount (%)
Microcrystalline cellulose (average particle diameter 5.8 micrometer)	0.5
Lauryl glucoside	2.5
Calcium hydrogenphosphate dihydrate	40.0
Hydroxyethyl cellulose	1.0
Flavor	1.0
Saccharin sodium	0.2
Sorbitol	25.0
Purified water	remainder

[0064] The oral composition obtained had an excellent shape-holding ability and dispersibility in an oral cavity, did not change a taste of juice after teeth brushing and had excellent stability with time.

Example 12

[0065] An oral composition (toothpaste) of the following formulation was prepared according to the conventional

procedures:

Ingredient Name	Amount (%)
Microcrystalline cellulose (average particle diameter 5.8 micrometer)	2.0
Decyl glucoside	1.5
Silicic acid hydrate	20.0
Carrageenan	1.0
Flavor	1.0
Saccharin sodium	0.1
Sorbitol	15.0
Concentrated glycerin	10.0
Purified water	remainder

[0066] The oral composition obtained had an excellent shape-holding ability and dispersibility in an oral cavity, did not change a taste of juice after teeth brushing and had excellent stability with time.

Example 13

[0067] An oral composition (toothpaste) of the following formulation was prepared according to the conventional procedures:

Ingredient Name	Amount (%)
Microcrystalline cellulose (average particle diameter 8.6 micrometer)	1.0
Cocamidopropyl betaine	0.8
Silica	15.0
Aluminum hydroxide	5.0
Sodium polyacrylate	0.5
Flavor	1.0
Saccharin sodium	0.2
Polyethylene glycol	5.0
Concentrated glycerin	10.0
Purified water	remainder

[0068] The oral composition obtained had an excellent shape-holding ability and dispersibility in an oral cavity, did not change a taste of juice after teeth brushing and had excellent stability with time.

Experiment

Method of Experiment

Measurements of an amount of cetylpyridinium chloride residing on hydroxyapatite powder

[0069] A 50 mg of hydroxyapatite (DNA Grade Bio-Gel HTP; manufactured by BIO-RAD) was immersed in 2 ml of human saliva, which had been sterilized with ultraviolet rays, at 37 centigrade for 15 hours to allow to form an artificial pellicle on a hydroxyapatite surface. Thereafter, a mixture of hydroxyapatite and human saliva was centrifuged (3000 rpm, 10 min) and a supernatant was discarded. Then, residual hydroxyapatite was immersed at 37 centigrade for 15 minutes in 2 ml of a supernatant of a four times-diluted slurry from each of the oral compositions of Examples 14-18 and Comparative Examples 5-8, in which 0.3 % by weight of cetylpyridinium chloride (CPC) and various amounts and various kinds of thickening agents and surface active agents had been contained. Then, a mixture was centrifuged (3000 rpm, 10 minutes), and a supernatant was discarded. Then, 2 ml of fresh distilled water was added to the residue, the mixture was stirred and centrifuged (3000 rpm, 10 min), and the supernatant was discarded. Again, 2 ml of fresh distilled water was added to the residue, the mixture was stirred and centrifuged (3000 rpm, 10 minutes), and the supernatant was discarded. Next, cetylpyridinium chloride which had adsorbed onto hydroxyapatite was extracted with an extraction solution as described below, and an amount of cetylpyridinium chloride residing on 50 mg of hydroxya-

patite was quantitatively measured with high performance liquid chromatography. The results thereof are shown in Table 2.

[0070] The extraction solution was prepared by mixing a solution in which 2.88 g of sodium lauryl sulfate had been dissolved per 1 liter of 0.02 M citrate buffer, pH 3 with acetonitrile in a ratio of 1:3.

[Table 2]

Ingredient	Example 14	Example 15	Example 16	Example 17	Example 18	Comparative Ex. 5	Comparative Ex. 6	Comparative Ex. 7	Comparative Ex. 8
Cetylpyridinium chloride	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Microcrystalline cellulose	4	4	4	3	3	-	-	-	-
Hydroxyethyl cellulose	-	-	-	1	1	4	4	4	-
Sodium carboxymethyl cellulose	-	-	-	-	-	-	-	-	1.5
Decyl glucoside	1	-	-	1	-	1	-	-	-
Lauryl glucoside	-	-	-	-	2	-	-	-	-
Cocamidopropyl betaine	-	1	-	-	-	-	1	-	1
Polyoxyethylene castor oil	-	-	1	-	-	-	-	1	-
Dicalcium phosphate dihydrate	35	35	35	35	35	35	35	35	35
Saccharin sodium	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Titanium oxide	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Flavor	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Glycerin	15	15	15	15	15	15	15	15	15
Ion exchanged water	remainder	remainder	remainder	remainder	remainder	remainder	remainder	remainder	remainder
CPC remaining amount (microgram/50 mg hydroxyapatite)	863	583	194	904	517	409	367	180	48

[0071] From the results in Table 2, it is found that an amount of cetylpyridinium chloride residing on a tooth surface is significantly increased with the oral compositions of Examples 14-18, in which cetylpyridinium chloride and microcrystalline cellulose have been specifically combined, as compared with those of Comparative Examples 5-8, in which the same amount of cetylpyridinium chloride and other cellulose derivatives have been combined. Moreover, it is also found that alkyl glucoside and betaine are preferable as the surface active agent to be contained in addition to the above ingredients, because they increase an amount of cetylpyridinium chloride residing on a tooth surface, as compared with other surface active agents.

Example 19

[0072] An oral composition (toothpaste) of the following formulation was prepared according to the conventional procedures:

Ingredient Name	Amount (%)
Benzethonium chloride	0.1
Microcrystalline cellulose (average particle diameter 3.7 micrometer)	2.0
Triclosan	0.1
Hydroxypropylmethyl cellulose	1.0
Lauryl glucoside	2.0
Calcium carbonate	40.0
Titanium oxide	0.2
Saccharin sodium	0.2
Sorbit solution	30.0
Flavor	1.0
Purified water	remainder

[0073] The oral composition obtained could increase an amount of the cationic antimicrobial agent residing on a tooth surface and could effectively prevent an oral cavity disease such as a periodontal disease, dental caries and the like.

Example 20

[0074] An oral composition (toothpaste) of the following formulation was prepared according to the conventional procedures:

Ingredient Name	Amount (%)
Cetylpyridinium chloride	0.1
Microcrystalline cellulose (average particle diameter 3.7 micrometer)	3.0
Potassium nitrate	1.0
Hydroxyethyl cellulose	2.0
Cocamidopropyl betaine	1.0
Concentrated glycerin	10.0
Sorbit solution	10.0
Titanium oxide	0.3
Stevioside	0.2
Sodium benzoate	0.1
Xylitol	10.0
Flavor	0.8
Purified water	remainder

[0075] The oral composition obtained could increase an amount of the cationic antimicrobial agent residing on a tooth surface and could effectively prevent an oral cavity disease such as a periodontal disease, dental caries and the like.

Example 21

[0076] An oral composition (gel) of the following formulation was prepared according to the conventional procedures:

Ingredient Name	Amount (%)
Cetylpyridinium chloride	0.1
Microcrystalline cellulose	
(average particle diameter 3.7 micrometer)	4.0
Decyl glucoside	1.0
Concentrated glycerin	40.0
Polyethylene glycol	5.0
Propylene glycol	3.0
Flavor	1.0
Saccharin sodium	0.1
Disodium hydrogenphophate	0.12
Sodium dihydrogenphosphate	0.01
Purified water	remainder

[0077] The oral composition obtained could increase an amount of the cationic antimicrobial agent residing on a tooth surface and could effectively prevent an oral cavity disease such as a periodontal disease, dental caries and the like.

Example 22

[0078] An oral composition (gel) of the following formulation was prepared according to the conventional procedures:

Ingredient Name	Amount (%)
Chlorhexidine hydrochloride	0.2
Microcrystalline cellulose (average particle diameter 3.7 micrometer)	5.0
Myristic acid amide propyl betaine	0.5
Tetraglycerin lauric acid ester	1.0
Tocopherol acetate	0.1
Concentrated glycerin	30.0
Polyethylene glycol	4.0
1,3-Butylene glycol	2.0
Flavor	1.0
Saccharin sodium	0.1
Disodium hydrogencitrate	0.12
Sodium dihydrogencitrate	0.01
Purified water	remainder

[0079] The oral composition obtained could increase an amount of the cationic antimicrobial agent residing on a tooth surface and could effectively prevent an oral cavity disease such as a periodontal disease, dental caries and the like.

Example 23

[0080] An oral composition (toothpaste) of the following formulation was prepared according to the conventional procedures:

Ingredient Name	Amount (%)
Benzalkonium chloride	0.05

(continued)

Ingredient Name	Amount (%)
Microcrystalline cellulose (average particle diameter 5.8 micrometer)	0.5
Sucrose myristic acid ester	4.0
Magnesium carbonate	5.0
Calcium carbonate	12.0
Guar gum	1.0
Flavor	1.0
Saccharin sodium	0.2
Concentrated glycerin	20.0
Purified water	remainder

[0081] The oral composition obtained could increase an amount of the cationic antimicrobial agent residing on a tooth surface and could effectively prevent an oral cavity disease such as a periodontal disease, dental caries and the like.

Example 24

[0082] An oral composition (gel) of the following formulation was prepared according to the conventional procedures:

Ingredient Name	Amount (%)
Chlorhexidine gluconate	0.2
Microcrystalline cellulose (average particle diameter 8.6 micrometer)	5.0
Myristyl glucoside	4.0
Hydroxypropylmethyl cellulose	1.0
Flavor	0.5
Saccharin sodium	0.2
Concentrated glycerin	20.0
Propylene glycol	3.0
Purified water	remainder

[0083] The oral composition obtained could increase an amount of the cationic antimicrobial agent residing on a tooth surface and could effectively prevent an oral cavity disease such as a periodontal disease, dental caries and the like.

[0084] According to the first aspect of the present invention, an oral composition can be provided, which has an excellent shape-holding ability and dispersibility in an oral cavity, does not change a taste of juice after teeth brushing, and particularly, excellent stability with time, or which has an enhanced ability of a cationic antimicrobial agent to reside on a tooth surface.

[0085] Moreover, according to the second aspect of the present invention, an oral composition can be provided, which can significantly increase an amount of a cationic antimicrobial agent residing on a tooth surface and effectively prevent an oral cavity disease such as a periodontal disease, dental caries and the like.

Claims

1. An oral composition comprising microcrystalline cellulose, and one or more surface active agents selected from the group consisting of alkyl glucoside, polyglycerin fatty acid ester, sucrose fatty acid ester and betaine.

2. The oral composition of according to claim 1, wherein the microcrystalline cellulose is contained at 0.2-10 % by weight.

3. The oral composition according to claim 1 or 2, wherein the surface active agent is alkyl glucoside.

4. The oral composition according to claim 3, wherein an alkyl chain of the alkyl glucoside is C8-C16 in length.

5. The oral composition according to claim 1 or 2, wherein the surface active agent is polyglycerin fatty acid ester or sucrose fatty acid ester.

6. The oral composition according to claim 5, wherein an alkyl chain of a fatty acid portion of the polyglycerin fatty acid ester or the sucrose fatty acid ester is C8-C16 in length.

7. The oral composition according to claim 1 or 2, wherein the surface active agent is betaine.

8. The oral composition according to claim 7, wherein the betaine is fatty acid amide propyl betaine.

9. The oral composition according to claim 8, wherein an alkyl chain of a fatty acid portion of the fatty acid amide propyl betaine is C8-C16 in length.

10. The oral composition according to any one of claims 1-9, further comprising a cationic antimicrobial agent.

11. An oral composition comprising a cationic antimicrobial agent and microcrystalline cellulose.

12. The oral composition according to claim 11, wherein the cationic antimicrobial agent is a quaternary ammonium salt.

13. The oral composition according to claim 11, wherein the cationic antimicrobial agent is a biguanide antimicrobial agent.

14. The oral composition according to claim 11, wherein the cationic antimicrobial agent is one or more selected from the group consisting of cetylpyridinium chloride, benzalkonium chloride, benzethonium chloride, chlorhexidine hydrochloride and chlorhexidine gluconate.

15. The oral composition according to any one of claims 11-14, wherein the cationic antimicrobial agent is contained at 0.001-10 % by weight.

16. The oral composition according to any one of claims 11-15, wherein the microcrystalline cellulose is contained at 0.2-10 % by weight.

17. The oral composition according to any one of claims 11-16, further comprising one or more surface active agents selected from nonionic and amphoteric surface active agents.

18. The oral composition according to claim 17, wherein the surface active agent is alkyl glucoside having an alkyl chain of C8-C16 in length.

19. The oral composition according to claim 17, wherein the surface active agent is fatty acid amide propyl betaine having an alkyl chain of a fatty acid portion of C8-C16 in length.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP02/05639

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] A61K7/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[7] A61K17/16

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Toroku Jitsuyo Shinan Koho	1994-2002
Kokai Jitsuyo Shinan Koho	1971-2002	Jitsuyo Shinan Toroku Koho	1996-2002

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
CAPLUS(STN), REGISTRY(STN)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E,X	JP 2002-179540 A (Sunstar Inc.), 26 June, 2002 (26.06.02), Full text; particularly, Claims 1 to 9; example 6 (Family: none)	1-12,14-17, 19
E,X	JP 2002-179541 A (Sunstar Inc.), 26 June, 2002 (26.06.02), Full text; particularly, Claims 1 to 9; examples 1 to 9 (Family: none)	1-4,7-19
X	JP 2001-39842 A (Kao Corp.), 13 February, 2001 (13.02.01), Full text; particularly, Claims 1 to 3; example 5 (Family: none)	1-6,10-17

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05 September, 2002 (05.09.02)	01 October, 2002 (01.10.02)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP02/05639

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 9-110663 A (Lion Corp.), 28 April, 1997 (28.04.97), Full text; particularly, example 1; examples of blending 5, 7 (Family: none)	1-6,11-16
X	JP 11-246377 A (Lion Corp.), 14 September, 1999 (14.09.99), Full text; particularly, example 5; Par. Nos. [0020], [0021] (Family: none)	1-9
X	JP 11-199456 A (Lion Corp.), 27 July, 1999 (27.07.99), Full text; particularly, examples 1, 8; Par. No. [0013] (Family: none)	1-9
X	JP 11-171751 A (Lion Corp.), 29 June, 1999 (29.06.99), Full text; particularly, examples 5, 8; Par. No. [0011] (Family: none)	1-9
X	JP 11-171750 A (Lion Corp.), 29 June, 1999 (29.06.99), Full text; particularly, example 3; Par. No. [0011] (Family: none)	1-9
X	JP 2001-302474 A (Lion Corp.), 31 October, 2001 (31.10.01), Full text; particularly, example 3; Par. No. [0010] (Family: none)	1-6
X	JP 11-199455 A (Lion Corp.), 27 July, 1999 (27.07.99), Full text; particularly, example 7; Par. Nos. [0015] to [0018] (Family: none)	1-9
X	JP 11-12168 A (Lion Corp.), 19 January, 1999 (19.01.99), Full text; particularly, example 2 (Family: none)	11-16

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP02/05639

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II *Observations where unity of invention is lacking (Continuation of item 2 of first sheet)*

This International Searching Authority found multiple inventions in this international application, as follows:
(See extra sheet.)

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (1)) (July 1998)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP02/05639

Continuation of Box No.II of continuation of first sheet(1)

It is recognized that the matter common to the "composition for the oral cavity which contains crystalline cellulose and one or more surfactants selected from the group consisting of alkyl glycosides, polyglycerol acid esters and betaine" as set forth in claim 1 according to the present application and the "composition for the oral cavity which contains a cationic bactericide and crystalline cellulose" as set forth in claim 11 according to the present application resides in being a "composition containing crystalline cellulose". As reported in the following document, it had been publicly known to use "crystalline cellulose in compositions for the oral cavity". Thus, this constitution cannot be considered as a novel fact and, therefore, cannot be regarded as the gist of the invention.

Moreover, it cannot be considered that these compositions have a common technical matter which had been unsolved until the application date.

Such being the case, the inventions as set forth in claims 11 to 19 of the present application and the inventions as set forth in claims 1 to 10 cannot be considered as a group of inventions so linked as to form a single general inventive concept.

Document: JP 11-199456A

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